SUPPORTIVE DEVICE FOR MICROWAVE HEATING AND COOKING OF FOOD

FIELD OF THE INVENTION

This invention relates to a supportive device, packaging and method utilised in the heating, drying or cooking of foods by microwaves. In particular, the invention may preventing moisture build up in the surface regions of food item during the microwave heating or cooking process.

BACKGROUND OF THE INVENTION

Microwave ovens are popular with almost every household having one, as they provide a relatively inexpensive and a quick way of heating and cooking food. However there is a problem when heating and cooking solid type foods in a microwave, especially those having relatively high moisture content such as pastries and pizzas, as they tend lose their quality and inevitably become soggy.

A microwave oven heats and cooks the food by heating the water in the food product. In traditional microwave heating and cooking methods at home, a user places a food item to be heated or cooked directly onto the microwave turntable plate or other substantially flat dish providing for poor air circulation beneath the food item. This results in a concentration of humidity underneath the food item when being heated or cooked resulting in moisture build up which is absorbed by the food causing it to become overly soggy and unpalatable.

WO94/16606 discloses an apparatus having a base with a number of slots therethrough, a plurality of upwardly extending cylindrical-like food support members and air flow directional means extending below the base for directing air flow from beneath the base to the space between the support members, base and the food. Though this apparatus works well in preventing moisture build up beneath food when being heated in the microwave, it is made from relatively thick materials and has a limited application as a kitchen appliance. It addition, it requires directional means and slots in the base to control the flow of air to circulate around the food.

In contrast, the present applicant has surprisingly developed a simple, convenient, light weight and cost effective food supportive device which may

known in the mathematical art of origami. In one embodiment, the supportive device may include a construction of a series of folded concertina-like flutes of thin paper, plastic film or the like, and may be fold-away or compactable so as to permit storage in a compact form.

Further, the compactable forms of the invention may utilise a vertical triangular fold derived from the membrane fold mathematics of origami at the end of each flute. This may provide additional stability to the foundation, as well as improving the load-bearing quality by the edge-loading of the thin membrane via the vertical fold. The device may be produced with or without these rigidifying peripheral folds.

In further embodiments, the supporting device may be also self-erecting such as the mechanism of a pop-up book. For example, the food contact areas and associated supports may emerge from a recessed or concealed position in the foundation. The food contact areas and associated supports may be concertina-like fluted folds or may be cut-outs in the foundation which are elevated when the support device is deployed into operative form.

In a preferred embodiment, the invention is particularly applicable in the microwave heating and cooking of pizzas, parathas, pastries, and other comestibles. Other food products that are suitable for use with the invention as described are muffins, fish fingers, garlic and herb type breads, pies, breads, baked vegetables, baked potatoes, bagels, potato wedges, croissants, battered and crumbed fish, buns, schnitzels, sausage rolls, cakes, pasties and the like.

This invention may improve the quality and texture of a food item when heated or cooked by microwaves in comparison to the situation where the invention is not utilised during microwave heating or cooking. In addition, the invention may provide a food product that is equal in quality to those that may be baked in a typical thermal oven. Of course, it is to be understood that a user must still use common sense to microwave the food at appropriate levels and time for the type of food item being heated or cooked. If a user microwaves for too long and/or at the wrong level then they will obtain an unpalatable product no matter what device is used. Quite often out of habit the user reheats food at the highest level as it is easy to simply press the timer which automatically uses the highest microwave power setting. A user would not use

a conventional thermal oven in this manner as they would understand that the food will be ruined at say 250°C to 300°C.

Generally, conventional ovens are similar in size, being between 2500-3000 watts, whether they are large or small ovens. Functionally reheating a food item at about 120°C is the same whether the conventional oven is small or large, though the larger oven may reach the required temperature sooner. However, the size of a microwave oven can causes a variation in the power that can differ 500 watts or more. For example, a small microwave oven could have a highest power of 500 watts, whereas a relatively large microwave could be in the order of 1200 watts. These differences are significant. Heating or cooking at full power in a small microwave oven as compared to heating or cooking at full power in a large microwave oven can cause substantial differences in the food quality despite the use of the present invention. It is to be appreciated that a person skilled in the art would understand these differences and will recognize the appropriate microwave wattage to heat the food item without it becoming ruined by overdrying.

Pastries heated in a microwave oven with the use of the present invention are suitably heated by utilising a relatively low microwave power for relatively longer time. Obviously, the power and time depends on the size of the microwave oven. This will enable the pastry to keep the original and crispy texture with the assistance of the present invention to enable the escape of moisture from the food to prevent it from going soggy. Reheating pizza or other solid food such as fish fingers may be heated with medium microwave power for a relatively longer time.

Accordingly, to take full advantage of the invention the best results for heating or cooking pastry or other food item are obtained by using low microwave power over a longer period of time. Of course it is to be understood the power and time depends on the type of food being heated which could range anywhere from high power to low power. However, it should be expected that common sense or taking the time to read the best heating or cooking procedures on a label of a food product utilising this invention that a person would recognise that the level of microwave power and time could be adjustable to preserve the texture of the cooked or heated food item.

It should be also noted that some pastry items to be cooked or heated in accordance with the invention should be relatively firm and preferably pre-cooked or

baked. It would be recognised by a person skilled in the art that some pastry food items that are relatively soft are generally not suitable for cooking and heating by microwaves on the device of the invention as they cannot be supported on the food contact areas.

Though not necessary, the food supportive device of the invention may also include a microwave interactive material, such as metallic inclusions capable of converting microwave energy into infrared energy to assist in the browning of the food product.

In addition, the invention as described may be used to dry out food products. When heating or cooking food it is not normally necessary to dry out the food as it would be unpalatable. However, many food items that are deep-frying to produce crispy food require that there is no moisture in the food as it would be detrimental to the deep-frying process. Such food items include potato chip, corn chips, tortillas and the like. Traditionally, these types of food are dried off in a thermal oven before deep-frying. However, by using the device of the invention these foods could be dried more quickly, conveniently and cost-effectively by microwaves as the devices allows the escape and venting of moisture from the food. Once dried the food can then be deep-fried and further processed to produce a commercial product.

In a further aspect this invention resides in a method of heating or cooking food by microwaves including the steps of:

placing a food item directly onto a food supportive device as described above into a microwave oven, and

microwaving the food item.

The food supportive device may be utilised as a kitchen appliance where the user can heat or cook food at home in the microwave oven on demand. Alternatively, the food supportive device may be used in packaging, the retail food industry and take away food industry so that when a customer purchases a packaged food item in accordance with the invention it can be conveniently taken home to be heated in a microwave oven in an quick and efficient manner to produce a quality food product.

According, in a still further aspect this invention resides in a food package including:

a food supportive device as described above, and

a closure attachable to the supportive device to define a cavity therebetween.

CLAIMS

1. A microwave transparent food supportive device used for microwave heating, cooking or drying of food including:

a plurality of food contact areas elevated from and substantially integral to a foundation that enables the support of food placed directly on the contact areas,

wherein spaces between the elevated contact areas and the foundation form conduits adapted to vent the moisture from the food when being heated, cooked or dried.

2. A food supportive device according to claim 1, wherein the foundation includes at least one support interconnected to each food contact area.

3. A food supportive device according to claim 1 or claim 2, wherein the foundation includes a base.

4. A food supportive device according to any one of claims 1 to 3, wherein the food is microwaved at a suitable power level and time to produce a palatable food product.

5. A food supportive device according to any one of claims 1 to 4, wherein the height of food contact areas is from about 10mm to about 15mm.

6. A food supportive device according to any one of claims 1 to 5, wherein the food contact areas are arranged in an array.

7. A food supportive device according to any one of claims 1 to 5, wherein the food contact areas form a pattern.

8. A food supportive device according to any one of claims 1 to 6, wherein moisture is expelled substantially isotropically from the conduits..

9. A food supportive device according to any one of claims 1 to 8, wherein the food supportive device is made from polymers, paper, paperboard or cardboard.

10. A food supportive device according to any one of claims 1 to 9, wherein the supportive device is formed by a moulding process.

11. A food supportive device according to claims 10, wherein the supportive device is made from PET or *papier-mâché*.

12. A food supportive device according to any one of claims 1 to 11, wherein the supportive device includes folds.

13. A food supportive device according to claim 12, wherein the folds are formed by origami methods.

14. A food supportive device according to claim 12 or claim 13, wherein the supportive device is compactable.

15. A food supportive device according to any one of claims 12 to 14, wherein the supportive device includes a series of folded concertina-like flutes.

16. A food supportive device according to any one of claims 12 to 15, wherein the supportive device is made of paper, plastic film or cardboard.

17. A food supportive device according to any one of claims 1, wherein the supportive device includes a foundation base which folds like a book and the food contact areas pop-up when the base is opened into operative form.

18. A food supportive device according to claim 17, wherein the food contact areas are cut-out in the base and are elevated when the base is opened into operative form.

19. A food supportive device according to any one of claims 1 to 18, wherein the supportive device is used to heat or cook pizzas, parathas or pastries.

20. A food supportive device according to any one of claims 1 to 19, wherein the supportive device includes advertising or indicia.

21. A method of heating, cooking or drying food in a microwave oven including the steps of:

placing a food item on a food supportive device according to any one of claims 1 to 20 into a microwave oven, and

microwaving the food product.

22. A food package including:

a food supportive device according to any one of claims 1 to 20, and

a closure attachable to the supportive device to define a cavity therebetween.

23. A food package according to claim 22, wherein an airtight seal is formed when the closure is attached to the supportive device.

24. A food package including:

a food supportive device according to any one of claims 1 to 20,

an open base adapted to receive the food supporting device, and

a closure attachable to the open base to define a cavity therebetween.

25. A food package according to claim 24, wherein an airtight seal is formed when the closure is attached to the base.

26. A method of drying food including the step of placing food onto the food supportive device according to any one of claims 1 to 20 and microwaving the food placed on the supportive device until the food is dry.

27. A food supportive device for microwave heating, cooking or drying of food including:

a plurality of food contact areas elevated from and substantially integral to a foundation that enables the support of food placed directly on the contact areas,

wherein spaces between the elevated contact areas and the foundation form conduits adapted to vent the moisture from the food when being heated, cooked or dried, and

wherein the supportive device includes a foundation base which folds like a book and the food contact areas pop-up when the base is opened into operative form.